much time in fixing it at each station, and in unfixing it again, and moving it from place to place, as this capstan would demand. The addition of the rollers to the mole plough seems an useful improvement, and there can be no doubt but that this plough by itself, independent of the capstan, drawn forward in the usual manner, would perform very well.

Patent of Mr. Samuel Clegg, of Manchester, for a Rotative Steam Engine, Dated July, 1809.

The piston of Mr. Clegg's Steam Engine, revolves horizontally in a hollow ring of cast iron, the vertical section of which is a semicircle; this piston is of the same shape as the ring, and is attached to a vertical axis in the centre by a flat bar, that lies between the upper plate of the engine, and the hollow ring. To prevent the steam from passing in the space about this connecting part, a number of upright pieces of metal, rounded a little at their bottoms, are placed all round in a smaller hollow ring, of a rectangular section, in contact and capable only of a verticle motion; the connecting part has a small roller in front, which passes under these upright pieces, and lifts them up in succession, and their own weight, assisted by springs at top, causes them to fall again into their first positions, as fast as the connector passes. Water is let in over them to keep the joints closer.

In the large hollow ring, a semicircular valve is placed on a hinge, which fits it exactly, and is capable of being moved up into a recess in the covering flat plate made to fit it. The steam is let in between this valve and the piston, which acquires momentum sufficient, before it comes round to it behind, to raise it up and pass beyond it; when it falls down again, and the action of the steam re-commences. The piston is represented of considerable bulk, with a view, it is supposed of encreasing the momentum so as to supply the action of a fly wheel. The power of the engine can be encreased by making a communication between a condenser, and the part of the large hollow ring at the opposite side of the valve from that at which the steam is admitted. The shaft or axis in the centre gives motion to the pumps, steam valve, and all other requisite movements. The engine may be made to work by the pressure of a column of water introduced instead of steam.

The patentee states that he finds these engines answer in practice all the intended ends; that they cost only half the price of beam engines, take up little room, and make no noise; he mentions also that the space through which a piston of an engine of twenty horses power moves, will generally be about twenty feet.

Remarks. No account is given of any method of stuffing the piston, and it is apprehended this would not be easily affected, or readily kept tight from the shape of this part. The complication of the upright sliding poppets, to close the path of the connector, is also very objectionable; and however perfectly the engine might work at first, while these parts were new and nicely fitted, there can be little doubt but that from their constant motion they would be soon worn so much as to let much steam escape to a loss, and that, if the engine did not actually stop from this circumstance, its powers for the same expense of fuel would be considerably inferior to those of Watt's beam engines.

On Electro Chemical Experiments, by Mr. G. J. Singer.

Phil. Jour. v. 24, *p.* 174.

Mr. Singer has found, that the prevalent idea of a powerful Voltaic battery being necessary for the repetition of the new experiments, is mistaken, and that when the requisite precations are observed, an apparatus of very moderate powers is sufficient.

The mode of employing the Voltaic battery at present in use, is by far the worst, when it is intended for experiments of decomposition; as this operation requires a continued action of a power of nearly uniform intensity, which but rarely occurs in the ordinary mode of charging.

Most experimenters estimate the acting power, and the best state of their apparatus by the length of wire which it will fuse. To obtain this object, a strong acid infusion is employed, when the battery is not of

great extent. This produces violent action for a short time, but which gradually decreases, and in a very limited period ceases altogether. But the power thus excited is by no means desirable for the performance of brilliant experiments; for the most extensive and interesting class of chemical compounds are either partial conductors, or non-conductors, on which this intense action will be found less efficacious than a continued one of moderate intensity.

The most active wire-melting power, Mr. Singer found to be excited by a mixture of one part of strong nitrous acid to ten parts of water.

A battery charged by nitric acid fused more wire than one charged by an equal portion of sulphuric acid, and this again more than one excited by the same quantity of muriatic acid: their action on imperfect conductors was nearly the same. At the end of fourteen hours they were again tried; the battery charged with nitric acid had completely lost the power of melting wire, as also had that charged by sulphuric acid; and neither of them exerted more than a feeble action on imperfect conductors; but the battery charged with muriatic acid, to the great surprize of Mr. Singer, melted two thirds of the length of wire it had melted at first, and appeared to decompose water with equal rapidity. The three batteries were suffered to remain for two days longer, at the end of which time the two first had totally lost their acting power, but the last still melted one third of the original length of wire, and continued to melt wire till the fourth day: Its action on imperfect conductors was still evident after six days, when the experiments were discontinued. In all these experiments, the plates were lifted out of the acid during the intervals. It was a long time before the batteries in which the nitric and sulphuric acids had been used, could be brought to an equal continuance of action; their powers appeared to be exhausted, and their action comparatively feeble; but by perseverance in the use of the muriatic acid, they were at length brought to an equal uniformity of action.

For the decomposition of potash, it is necessary that the proportion of the acid to the water should vary according to the number of plates employed. For any power not exceeding 200 plates of four inches, the proportion should be from 8 to 10 ounces of muriatic acid to every gallon of water. But if 300, 400, or any greater number of plates be used, the quantity of acid should be proportionally less, or the heat produced will destroy the metallic globules, at the moment of their production.

In the first experiments made on Potash by Mr. Singer, the operation was performed under naptha, but in this way he found that the naptha was decomposed more rapidly than the potash and that the quantity of carbon liberated embarrassed the result. Mr. S. always operates now in the open air, and uses conductors of silver which he finds preferable to platina. A flat silver plate, or spoon is connected with the negative; (the copper) surface of the battery. On this a small piece of potash is placed, not moistened, and a communication is made by a silver wire from the positive surface. In about a minute the globules will begin to appear, and when they cease to grow larger, they should be removed on the point of a silver knife into a watch glass filled with Naptha, when globules do not appear, the communication should be continued for five or ten minutes, when the potash being taken from the spoon, the side which was in contact with it will be found studded with metallic globules. By operating in this manner Mr. Singer soon found that a much lower power, than he before suspected, was sufficient. Metallic globules were produced by a glass partitioned battery of 50 pairs of 4 inch plates. This result induced trials with less powers, and by carefully conducting the process Mr. S. procured globules by a battery of 50 pairs of 3 inch plates, which had moreover the disadvantage of having been much corroded by firmer operations. The metallization of the alkaline earths, and of ammonia, by amalgamation with mercury may be also effected by this latter battery. The transfer

of acid and alkali may be likewise shown by it, which is best done by the following means.

To a pint of water add two or three drops of sulphuric acid, and infuse in it as many leaves of minced red cabbage as it will cover. In a day or two the water will be tinged of a fine red colour, decant the liquor and preserve it in a bottle closely stopped, when the experiment is to be performed, a portion of the red tincture is to be neutralized, by carefully adding a few drops of ammonia, till it assumes a blue colour. Two watch glasses, connected by a moistened fibre of cotton, or bibulous paper, are to be filled with this fluid, and placed in the Voltaic circuit by connecting one of them with the negative, and the other with the positive wire of the battery. In a short time the alkali attracted by the negative wire, will convert the fluid it touches to a green colour, while positive wire will convert that in the other glass to a fine red, by attracting the acid. In about an hour the transfer will be complete, the fluid in the positive cup being of a bright red, and that in the negative cup of a beautiful green. If the situation of the wires is reversed the red coloured liquor will become green, and the green red, after each becoming blue first. This alternate transfer of colour, which may be several times repeated with one charge, has been frequently produced by a single trough of only 30 pairs of two inch plates

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Observations....This paper of Mr. Singers contains the latest discoveries relative to the management of the Voltaic apparatus, and is particularly remarkable for pointing out the singular property muriatic acid possesses, of continuing the action of the trough; and in showing very simple and cheap means by which all the new Electro-chemical experiments may be performed.

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*On the influence which the shape of a still has on the quality of the product of Distillation by M. Curaudau. Sonnini's Journal, Tom.*1 *p.*106.

M. Curaudau states that he was so entirely convinced of the advantage of the broad shallow stills, proposed by M. Chaptal that he recommended them in his writings without hesitation. Further experience, however, has proved to him that they have inconveniences which render them less fit for the distillation of wine, than the stills in common use.

In deep stills the liquor at a certain time receives more heat than it gives off by evaporation; the temperature then may rise, till it reaches the term at which the ebullition is complete, an essential condition for effecting the combination of the alcohol with the aroma of the wine. Distillation is doubtlessly performed quicker in shallow stills, but the brandy obtained in this method, contains nothing or next to nothing of that aroma which is so grateful to the smell, and communicates the agreeable flavour, that distinguishes well made brandy.

To prove these facts M. Curaudau subjected to distillation a quantity of wine, part in a shallow still, and part in a still of the common construction; when the distillation was concluded, the products were examined by several different persons, all of whom decidedly gave the preference to the brandy produced by the common deep still: this is accounted for from the evaporation being very abundant in the shallow still, at an heat of from 45° to 55° Reaumur (133° to 156° F.) while in the deep still it does not begin to be copious till the heat is from 70° to 75° (190° or 200° F.)

Experience proves that ebullition is necessary to extract the alcohol from the wine. This boiling favours the combination of the aroma, from the re-action, and new combination which it occasions. M. Curaudau attributes the difference of the heat to which the liquor can be brought in the deep and in the shallow stills, to the greater evaporation of the latter which always keeps pace with the heat produced, or in other words, encreasing the fire under it only accelerates the evaporation without adding to the heat of the liquor. From his experiments and observations, M. Curaudau concludes.

1. That shallow alembics, though fit for the distillation of certain fermented liquors may sometimes alter the products of distillation.